TE (EXTC) V 2215/13
RF ckt. Design.

P3–upq–Feb.–13KL–146 A4 E

Con. 7283–13. **GS–9018**

(3 Hours) **[Total Marks : 100**

N.B. :(1) Question No. **1** is **compulsory**.
(2) Answer any **four** out of remaining **six** questions.
(3) Assume **suitable** data wherever **required** and **justify** the **same**.

1. (a) Draw lumped element circuit model for transmission line. Derive the expression for voltage and current travelling waves. **5**
(b) Explain simplified Ebers-Mall model for forward active mode of a transistor. **5**
(c) Explain current flow in pn junction and give the expression for Idiff in terms of diffusion constant and Vdiff in terms of doping concentration. **5**
(d) Discuss terminations used for microstrip lines. **5**

2. (a) Prove the first three Kureda's Identities by computing appropriate ABCD matrices. **10**
(b) Explain construction and functionality of HEMT. **10**

3. (a) Discuss power considerations in transmission line when **10**
(i) Source and Load impedances are matched
(ii) Load impedance is matched and source.
(b) Explain with equivalent circuits the RF behaviour of resistor, inductor and capacitor. **10**

4. (a) Explain Insertion loss, Ripple factor and bandwidth in relation to filter design. Why ideal filter response cannot be realised ? **6**
(b) If $Z_0 = 50\Omega$, plot the following impedances on Smith chart. **4**
$23 + j42\Omega$, $12 - j109\Omega$, $72 + j42{\cdot}5\Omega$ & $115 - j22\Omega$
Find corresponding admittances and VSWR. **10**

5. (a) Define & derive AC parameters for BJT and FET. **10**
(b) Explain the role of scattering parameters and its properties at RF and microwaves. **10**

6. (a) Explain schottley contact with help of energy band diagram for metal semiconductor contact. **10**
(b) Derive expression for internal, external and loaded quality factors for standard series and parallel resonant circuit. **10**

7. Write short notes on :—
(a) Realization of capacitors and inductors using sections of transmission lines **7**
(b) Microstrip transmission lines **7**
(c) Butterworth filter. **6**

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